# Pilot Course Curriculum and Intervention Plan for Basic course in statistics (UiB)

## “Improving the quality and sustainability of learning using early intervention methods based on learning analytics”

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# 1 General course information

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| **Course name** | STAT110: Basic course in statistics |
| **Institution** | University of Bergen |
| **Course level** | Undergraduate |
| **Teaching model** | Blended |
| **Course learning objectives** | To give an introduction to probability theory and statistical methods, with emphasis on the former. |

# 2 Motivation and purpose (Why)

| **Goal of the inquiry** | |
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| **What do you want to learn about the teaching and learning process?** | The overall objective is to obtain insights into students’ engagement with online learning resources and activities, and how this engagement associates with students’ learning outcomes. In particular, the aim is to answer questions such as:<br>- How engaged are the students with online course materials (slides, videos, formative quizzes)?<br>- How regular and how successful are the students in completing the course quizzes and assignments?<br>- What course materials are most visited / used by the students? And what course materials receive less students’ attention?<br>- Is there an association between the use of distinct online course materials and the students’ course performance?<br>- How successful are the students in regulating (planning, monitoring, adjusting) their learning in this course?<br>- How motivated and interested are the students for the course topics?<br>- How well do students regulate their effort and time devoted to this course?<br>- If / How do students seek help and provide help to their peers? |

# 3 Defining more precisely what to explore (What)

| **Specific questions of interest** | |
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| **Key inquiry questions** | How many students access online course materials (slides, videos) for the given week before the week’s lecture?<br><br>How do students interact with online course materials: do they use both videos and slides or tend to focus on one of these? How much time do they spend on videos? Do / How do they engage with formative quizzes? …<br><br>If / How do the students’ interaction with online course materials change over time?<br><br>What course materials receive more / less students’ attention? Do students engage with optional readings?<br><br>Which course materials may require revisions / improvements to be more comprehensible / useful to the students?<br><br>Is regular engagement with online course materials associated with better course performance (quiz and assignment scores)?<br><br>If / How the students’ motivation change throughout the course?<br><br>How successful the students are in regulating their learning time and effort throughout the course?<br><br>How often do students provide help (feedback) to their peers? What is the quality of the feedback they provide to their peers? |
| **Data sources** | Data logged by Canvas LMS, including logs of students' engagement with online course materials (videos, slides), quiz and assignment submissions and scores, and the like.<br><br>Survey data about different aspects of students’ self-regulated learning (time management, effort regulation, motivation, etc.) |

# 4 Data collection strategy (How)

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| **Data sources** | Canvas, the LMS used in the course as the main learning platform<br>Concise SRL survey, weekly survey administered through Canvas<br>Students will be asked to give their informed consent for the use of the collected data, using Informed consent form prepared for the ISILA project. If a student does not consent to the data use, the data of that student will ***not*** be used for any data analyses. |
| **Data aggregation** | Data will be collected in xAPI format and integrated into Learning Locker using custom xAPI mappings developed within the ISILA project |

**Detailed methods for data collection**

| **Course week** | **Topic** | **Learning activities and materials** | **Data source(s) and collection method(s)** |
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| **1** | Descriptive statistics | Video 1<br>Chapter 1 slides<br>Quiz 1 (formative assessment)<br>Optional python code examples and tasks (1) | Engagement data logged by Canvas<br>SRL survey |
| **2** | Probability | Video 2<br>Chapter 2 slides<br>Quiz 2 (formative assessment)<br>Optional python code examples and tasks (2) | Engagement data logged by Canvas<br>SRL survey |
| **3-4** | Discrete probability distributions | Video 3<br>Chapter 3 slides<br>Quiz 3 (formative assessment)<br>Optional python code examples and tasks (3) | Engagement data logged by Canvas<br>SRL survey |
| **5** | Continuous probability distribution | Video 4<br>Chapter 4 slides | Engagement data logged by Canvas<br>SRL survey |

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| | | Quiz 4 (formative assessment)<br>Optional python code examples and tasks (4) | |
| **6** | Simultaneous distributions | Video 5<br>Chapter 5 slides<br>Quiz 5 (formative assessment)<br>Optional python code examples and tasks (5) | Engagement data logged by Canvas<br>SRL survey |
| **7-8** | Distributions of sums of random values | Video 6<br>Chapter 6 slides<br>Quiz 6 (formative assessment)<br>Optional python code examples and tasks (6) | Engagement data logged by Canvas<br>SRL survey |
| **9-10** | Parameter estimation | Video 7<br>Chapter 7 slides<br>Quiz 7 (formative assessment)<br>Optional python code examples and tasks (7) | Engagement data logged by Canvas<br>SRL survey |
| **11** | Confidence intervals | Video 8<br>Chapter 8 slides<br>Quiz 8 (formative assessment)<br>Optional python code examples and tasks (8) | Engagement data logged by Canvas<br>SRL survey |
| **12-13** | Hypotheses testing | Video 9<br>Chapter 9 slides<br>Quiz 9 (formative assessment)<br>Optional python code examples and tasks (9) | Engagement data logged by Canvas<br>SRL survey |

# 5 Data analysis and interpretation (So What)

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| **Sense making and interpretation context** | The data collected and stored in the UiB’s Learning Locker instance, will be visually explored in order to identify patterns in the data, which may be indicative of a need for intervention. In particular, dashboards will be used to visually explore and analyze:<br><br>- The level and dynamics of students’ engagement with distinct course materials, including videos, slides, and formative quizzes, as well as extra-curricular content (code examples and tasks)<br><br>- How easy / difficult distinct formative quizzes are for students (based on the number of attempts and incorrect responses)<br><br>- The patterns in accessing videos, slides, and formative quizzes, as these may indicate learning strategies adopted by students<br><br>- Correlations between the level of engagement with distinct online course materials and course performance (assignment scores)<br><br>- The level of engagement in peer feedback and its association with the students’ course performance<br><br>- The dynamics of the students’ motivation, effort, time management, help seeking and other aspects of self-regulation of learning throughout the course |

# 6 Interventions plan (Now What)

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| **Potential interventions** | Intervention strategies that will be considered include:<br><br>- Face-to-face interventions in the form of consultations with either individual students or groups of students whose patterns of interaction with learning materials suggest significantly lower engagement compared to the overall cohort or form of engagement not aligned with the course design and/or objectives. Such interventions (consultations) may include talking to students to understand any issues they may be facing with the course; suggesting / arranging additional / different learning activities; offering direct help (e.g., explanations) regarding particular course topics, etc.<br><br>- Internet-based interventions oriented to many / all students in the cohort, in case low engagement with certain course materials or misunderstanding of certain course topics are detected. These interventions may take the form of email reminders, or recommendations of additional learning resources or explanations of misconceptions (course or subject matter related), communicated via course forum.<br><br>- Revision of learning materials that received low engagement. This may include, for example, adding more / different additional reading materials, offering the same topic in different modalities (e.g., video tutorials), etc.<br><br>- Rethinking of the course design and considering potential changes for the following course edition |